

## **Appendix P: Meteorological Conditions Coinciding with Ozone Formation in Maine**

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### **1. Ozone Transport Regimes in Maine**

The following are meteorological scenarios conducive to ozone formation in Maine:

- 1) Synoptic flow at 800 meters AGL and above with winds typically from the west (lack of ozone sinks aloft with high elevation monitors recording higher ozone concentrations at night and early morning)
- 2) Channeled flow between 200 and 800 meters AGL with winds from the southwest or west along the coast
- 3) Surface (below 200 meters AGL) winds from the southwest during the day.
- 4) Leese side trough creating SW winds along the coast
- 5) Gulf of Maine and its associated lack of ozone sinks and shallow stable marine boundary layer. Seabreeze can recirculate ozone and ozone precursors along the coast.
- 6) Highest ozone concentrations occur frequently during the hours just before a cold front or squall line passage.

In Maine, ozone levels have not been observed to exceed the NAAQS unless there is at least a moderate westerly to southwesterly wind at the surface. Typical ozone episodes are characterized by the concentration of transported ozone and precursors in the Gulf of Maine during the morning and mid-day hours, with afternoon sea breezes bringing high concentrations of ozone ashore in the afternoon and evening. Air quality monitoring data of ozone concentrations and wind vectors show ozone exceedences in Maine to be the direct result of a large mass of both ozone and unreacted precursors being transported into the Gulf of Maine from areas to the south and west, where precursors react and are then transported ashore, a conclusion supported by data collected by monitors on both the MS Scotia Prince in the Gulf of Maine and on land-based monitors that show significantly decreased levels of ozone at inland sites (AIRS).

Peak ozone concentrations in Maine are generally recorded in the late afternoon and evening, with exceedences occurring sequentially along a monitoring network from the New Hampshire border to Acadia National Park; this latter site often records its highest ozone levels during the overnight hours

1   **2. MAJOR LONG RANGE TRANSPORT TO MAINE CONTRIBUTOR**  
2   **SOURCE REGIONS**  
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- 4   1) Ohio Valley region (1-hr and 8-hr NAAQS violations)  
5   2) Great Lakes region (US and CANADA) (8-hr NAAQS violations)  
6   3) I-95 Corridor (1-hr and 8-hr NAAQS violations)  
7   4) Boston Metropolitan Area (1-hr and 8-hr NAAQS violations from transport along the  
8   coast and in the Gulf of Maine)  
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10   **3. SPECIFIC OZONE TRANSPORT TO MAINE REFERENCES**  
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12       1) November 1996 submittal to EPA of: Maine DEP's "Overwhelming Transport  
13       Demonstration for Ozone" and August 15, 1997 submittal to EPA of: "Petition  
14       of the State of Maine for Abatement of Excessive Emissions Pursuant to 42  
15       U.S.C. §7426". OTAG, NARSTO-NE aircraft studies, photochemical modeling  
16       "zero out" analyses plus much more.  
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18       2) MEDEP PAMS analyses, Scotia Prince data analyses, Trajectory analyses and  
19       time of day analyses.  
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21       3) Sept 1998 Journal of Applied Meteorology paper by Robert S. Gaza, NYDEC  
22       titled "Mesoscale Meteorology and High Ozone in the Northeast United States"  
23       (leeside trough and seabreeze)  
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25       4) October 1997 report by the Secretariat of the Commission for Environmental  
26       Cooperation: "Long-Range Transport of Ground-Level Ozone and Its Precursors:  
27       Assessment of Methods to Quantify Transboundary Transport Within the  
28       Northeastern United States and Eastern Canada"  
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30       5) March 2, 1998 addendum submittal to EPA of Maine's Overwhelming  
31       Transport Demonstration  
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33       6) April 27, 1998 Submittal to EPA: "The State of Maine's Response to US  
34       EPA's Comments on Chapter 113" Contains analysis of aged vs. fresh ozone  
35       precursor emissions.